

PACIFIC AREA WIDE MB ALTERNATIVES PROGRAM FOR CUT FLOWER AND BULB CROPS.

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Producers of cut flowers and ornamental bulbs are highly dependent on pre-plant soil fumigation with methyl bromide/chloropicrin (MB/Pic) for profitable production. Of the total MB consumption by this commodity, about 2/3 are used in open field operations and 1/3 under cover (mainly greenhouses). Alternative fumigants that have shown potential to replace MB/Pic include chloropicrin, 1,3-dichloropropene, iodomethane, and metam sodium, applied alone or in combination through the drip irrigation system. The use of virtually impermeable film (VIF) appeared to further enhance the efficacy of alternative fumigants on soil-borne pests and reduce fumigant emissions. Although some alternative fumigants in combination with novel soil sealing techniques have shown similar efficacy as MB/Pic in some situations, these alternative systems may not be feasible for all species due to the complexity and diversity of this commodity, and the on-farm and greenhouse feasibility of these systems for each of the major species of ornamentals grown in California remains to be demonstrated. Therefore, additional field and greenhouse based demonstration trials are critical to facilitate the transfer of scientific knowledge and technology on feasible MB alternatives to the very diverse and complex floricultural industry in California, and thus, to overcome past constraints for a successful adoption of economically viable alternative fumigation systems by this commodity.

The main objective of the proposed project is to facilitate an area-wide shift from pre-plant shank MB/Pic or hot gas (MB/Pic 98/2) application to effective alternative systems for control of key diseases and weeds in open field and greenhouses, respectively, by California cut flower and ornamental bulb producers.

Specific objectives of the on-farm demonstration shank and drip trials are:

1. Demonstrate the performance of reduced rates of alternative fumigants and fumigant combinations on marketable yields of major ornamental crops in response to more stringent buffer zone and township cap regulations.
2. Compare performance of reduced rates of shank injected and drip applied alternative fumigants relative to the commercial standard practice.
3. Demonstrate the improved VIF technology (use of suitable glues, maintenance of the integrity of the mulch during field installation) for increased efficacy and reduced emissions of shank injected and drip-applied fumigants relative to conventional (HDPE) mulch.
4. Demonstrate the performance of 1,3-D and Pic (Telone C35 EC) followed by Vapam under VIF on marketable yields of selected ornamental crops under greenhouse conditions relative to the commercial hot gas practice.

Conduct field days, floricultural teaching schools and panel discussions with cut flower and ornamental bulb growers, and establish a website with information of the trials to facilitate technology transfer, hands-on training and feedback on alternative fumigation systems between researchers, growers and regulatory agencies.

Four sets of trials have been established beginning in May 2007 in California. The first trial was established in Moss Landing with calla lilies for the production of cut flowers for the wholesale market and for rhizomes to be sold to propagators of potted flowering plants. The major pests of this crop are *Pythium* root rot, soft rot of the rhizomes caused by *Erwinia carotovora*, and a variety of weeds, including volunteers. This crop is direct seeded with true seed on 52" beds; there are 15 seed lines on each bed using 5 drip irrigation tapes. Treatments in this trial consist of 6 chemical treatments applied through the irrigation tapes in 1.5" of water under both HDPE and VIF. The chemicals being tested include chloropicrin (Pic; 150 lb/acre), InLine (62% 1, 3-dichloropropene [1, 3-D] 35% Pic; 200 lb/acre), PicClor (60% Pic, 35% 1, 3-D; 150 lb/acre), Midas (33% iodomethane [IM], 66% Pic; 150 lb/acre), MB/Pic (67%/33%; 150 lb/acre); and a untreated control (water). A week following the initial treatments, all plots were treated with metam sodium (26 gal/acre) to enhance weed control. The crop was then planted 3 weeks later.

Much of the MB used in cut flower production is applied in greenhouses and other covered structures by the hot gas method using MB/Pic (98/2, 435 lb/acre). This method is one of the least effective uses of MB and has a very high rate of emission to the atmosphere. The second trial attempts to address an alternative to this method. The treatments in this trial consist of the above MB/Pic treatment compared to InLine (200 lb/acre) followed by metam sodium (35 gal/acre) and a untreated control (water). The InLine was applied by 5 drip irrigation tapes on 60" wide flat planting beds in 1.5" water. The crop is Dutch Iris, planted with bulbs, and the major pests are *Fusarium oxysporum* which causes a vascular wilt and a variety of weeds, including volunteers.

Shank fumigation is currently the only soil disinfestation method for the production of Gladiolus, because this crop is not planted in preformed beds. Problem pests for this crop are *Fusarium* wilt and a variety of weeds, including volunteers. The third trial focuses on shank-applied fumigant alternatives to MB/Pic for this cropping system. Shank treatments include Pic:Clor (150 lb/acre, VIF); Telone C35 (200 lb/acre, VIF); Midas (50/50, 150 lb/acre, VIF), MB/Pic (67/33, 350 lb/acre, HDPE); and a untreated control. Three weeks following fumigation, Gladiolus corms were placed on the soil surface and a bed is listed over them. This trial was established in August 2007.

The fourth set of trials will be conducted in Ranunculus systems for cut flower and bulb production. Ranunculus is a direct seeded crop, and the major diseases are root rots caused by *Pythium* spp. and *Rhizoctonia solani*. Besides pathogen control, management of weeds and volunteer crops is crucial for the production of this crop. The demonstration trial will be established in October 2007 and consisted of drip and shank applied fumigant treatments, corresponding to trials in Calla lily and Gladiolus systems.